

## Editorial - What is the limit of men in swimming?



**Figure.** From Johnny Weissmuller, the Tarzan (in 1922), to the brazilian César Cielo (in 2009), the time of the 100 freestyle event in long course swimming pool evolved a little more than 10 seconds.

## What is the limit of men in swimming?

*Statistical studies have shown that, in recent decades, the evolution of swimming times seems to be reaching its limit.*

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### ABSTRACT

**M**uch has been said about the evolution of times in competitive swimming. Statistical studies have shown that in recent decades the progress of swimming records seems to be reaching its limit. Man does not swim much faster today than he did ten years ago. But...

Human beings carry within themselves the possibility of dreaming. The dream of going to the moon led man to conquer space, just as records will continue to fall, as long as there are swimmers who dream of swimming faster and faster. (1)

**Keywords:** *world record, ranking, speed, swimming times*

## INTRODUCTION

The differences between the first-place finishers in the great swimming events are increasingly difficult to be noticed, without the help of an accurate electronic scoreboard that shows us that the distance between a gold medal and a bronze one is only milliseconds! It gives the impression that soon there will be no more differences between the first placed ones.

From Johnny Weissmuller, the Tarzan of cinema (in 1922), to the Brazilian César Cielo (in 2009), the time of the 100 freestyle event in long course evolved from 58sec06 to 46sec91. In other words, we are swimming just over 10 seconds faster almost 90 years later (Figure).

Historically, there was a relevant moment in the evolution of swimming times between the late 60s and early 70s. It is a period of highly scientific advance with the studies of James Counsilman and other researchers who evaluated swimming from the point of view of biomechanics, physiology and psychology. The science of swimming emerged and athletes swam faster and faster. The dark side of this science would also help to improve performance with the advance of doping, especially in Eastern European countries. World records kept being broken.

## IS IT POSSIBLE TO SWIM FASTER?

This brief historical overview gives an idea of the type of condition that could favor a new start in the evolution of sport: sport-oriented science and technology. From this point of view, wouldn't we be, then, at a pivotal era for the growth of swimming times? Today, we have so-called fast pools, built according to architectural designs that favor athletes, anti-wave lanes, technological suits made especially for swimmers to glide faster and in-depth knowledge of swimming techniques. And did the athletes' speed increase? There are controversial studies, but in general, mathematics is what defines the evolutionary average and, although in some years we have the impression of a high advance, in others, times fall again and in the mean, we have not gone very far.

A recent statistical study in the field of men's and women's swimming times was carried out by a group of scholars from several British universities at the end of 2006 and published in the last edition of the year 2007 of the International Journal of Sports Medicine. And their conclusion is not very encouraging: we are reaching a limit and not every technology will be able to change that. Women have also evolved a lot, but they are also reaching their maximum, 10% behind men.

The english researchers evaluate male and female swimming records evolution in the 100, 200 and 400 freestyle events between the years 1957 and 2006. In this, practically, half a century, apart from the significant changes between the '50s and '70s, today the situation has stabilized. The authors made a comparison with running events in athletics and identified an almost identical picture: times do not evolve much further and women, despite an expressive advance in recent decades, also stagnated and behind men.

The question about the possibility of women's times still evolving a lot, since men have an average advantage of 10% over them is discarded by the study and justified on anatomical and physiological grounds. Female athletes have masses and a smaller left ventricular cavity than men. It also has 5 to 10% less hemoglobin, resulting in less oxygen-carrying capacity. Lung volumes and maximum expiratory capacity are also lower. And finally, they have more fat mass. All these factors influence the aerobic capacity for exercise, which in swimming tests account for a large part of the effort performed.

## AND IN THE FUTURE, WILL THERE BE RECORDS?

Professors Rômulo Noronha and Eduardo Araya outlined the recipe in an edition of NADAR! (1):

The athlete will be able to break records if he sees his sport as a professional. Behind each record achieved there is always a multidisciplinary team of technicians and researchers guiding and managing conditions conducive to success. The athlete becomes the visible instrument that makes it possible to reach the goal. New records can be set respecting certain premises: adequate health for the effort, biotype relevant to the characteristics of the test, progressive acquisition of propulsive force, analysis and economy of movement, administration of training and dosage of competitions. All of this works if the athlete has the will and desire to win.

### 100 FREESTYLE WOMEN

1957: 1,66 M/S

### 100 FREESTYLE MEN

1957: 1,8 M/S

1980: 1,8 M/S

1980: 2,0 M/S

2006: 1,85 M/S

2006: 2,1 M/S

**Table I.** EVOLUTION OF THE AVERAGE SWIMMER SPEED (2)

## FINAL CONSIDERATIONS

Whenever the human being reaches a limit, it is necessary to break old paradigms to overcome it. So it was, for example, in the early '70s, when some scholars, such as James Counsilman, from the USA, exhaustively observing, through filming, some of the best swimmers in the world, found that the hands of those champions drew submerged trajectories that deviated considerably from a simple straight line. Rather, it seemed that the hands acted like leaves creating lifting forces perpendicular to their movement. Counsilman's sophisticated work served this understanding. A paradigm was broken, however, hands and arms were still believed to be the agents of propulsion.

In the '90s, the use of arms as the main driving agents began to be questioned (3). The much more developed hip musculature could be better used when the swimmer rotated with each stroke, resulting in two significant achievements: increased stroke speed and reduced stress on the shoulders by decreasing the responsibility of the arms.

But paradigms are not only broken by technicians and scientists. The market can do it too! The competition for medals does not depend only on the athletes' efforts. The world's largest manufacturers of sports equipment are also making their contribution, developing new technologies to improve competitive performance, especially by creating swimsuits that favor athletes.

And if all that fails, we'll still have to swim like fishes. For famous US coach Terry Laughlin, developing the aerodynamic abilities of fish makes us faster in the water. The basis of fish swimming would be in not creating resistance or reducing it to the maximum, through economy of movements, swimming with grace and fluency, whether in training or competition (4).

The fastest creature of the seas, the sailfish can reach up to 110 km/h with the help of jumps, but even when it doesn't make these jumps, it reaches around 55 km/h. If the fish competed in the 200 freestyle event with Olympic medalist Michael Phelps, he would finish the course in less than 13 seconds, with the swimmer taking almost a minute and a half.

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